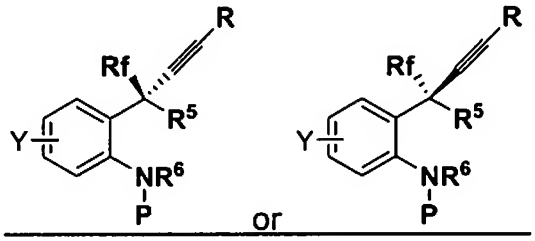
Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently amended): A process for synthesizing a chiral compound having a formula of



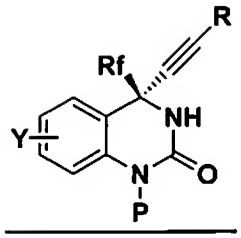
wherein Y is H, mono- or multi-substituted electron-withdrawing group or electron-donating group, and is located at *m*-,*o*-,or *p*-position of the benzene ring;

P is hydrogen or an amino protecting group;

Rf is a fluoro-containing alkyl;

R is a trialkylsilyl, alkyl, cycloalkyl, or aryl group;

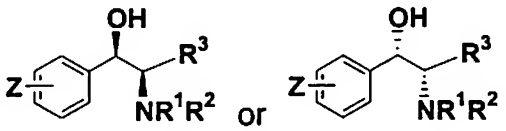
R^6 is hydrogen and R^5 is hydroxy, or R^5 and R^6 are linked as –HNCO- to form a ring as in



or its enantiomer,

comprising the steps of

(a) mixing a chiral ligand (1R, 2R)-2-*N*, *N*- substituted-1-(substituted -phenyl)-2-R^3-substituted-2-aminoethanol or its enantiomer having a formula of

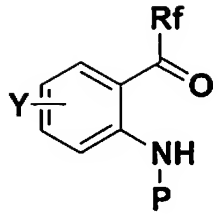


with a terminal alkyne and a Zn(II), Cu(II) or Cu(I) salt in the presence of an organic base in an aprotic solvent to form a mixture,

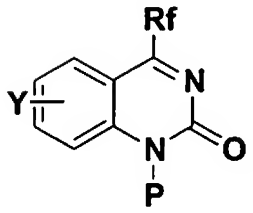
wherein R^1, R^2 is an amino protecting group; R^3 is an alkyl, alkyl-substituted with an alkyloxy or silyoxy, carboxylic group, carbalkoxy group, hydroxyl methyl, cycloalkyl , aryl, or CH_2OR^4, R^4 being an oxygen protecting group; Z is H, a mono- or multi-substituted ~~subsubstituted~~ electron-withdrawing group or electron-donating group, and located at m-, o-, or p-position ~~positon~~ of the benzene ring[;], and ~~with a terminal alkyne and a Zn(II), Cu(II) or Cu(I) salt in the presence of an organic base in an aprotic solvent,~~

wherein the terminal alkyne is H—≡—R, and R is a trialkylsilyl, alkyl, cycloalkyl, or aryl group,

(b) mixing ~~with~~ the mixture with a reactant having a formula of



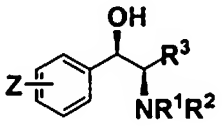
or



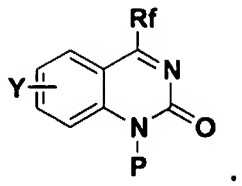
wherein P is hydrogen or an amino protecting group, Rf is a fluoro-containing alkyl, Y is H, a mono- or multi-subsubstituted electron-withdrawing group or electron-donating group and located at *m*-, *o*-, or *p*-positon of the ring[;], and

(c) isolating and obtaining the a chiral compound.

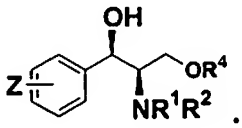
Claim 2 (Currently amended): The process of claim 1, wherein the chiral ligand (1R, 2R)-2-*N*, *N*- substituted-1-(substituted -phenyl)-2-R^3-substituted-2-aminoethanol or its enantiomer is (1R, 2R)-2-*N*,*N*-substitutedamino-1-(substituted-phenyl)-2-substituted-2-aminoethanol having a formula of



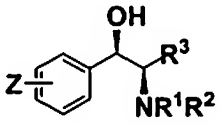
, and the reactant is



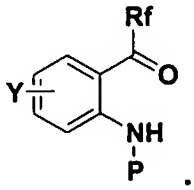
Claim 3 (Previously presented): The process of claim 2, wherein the chiral ligand is (1R, 2R)-2-*N*,*N*-substitutedamino-1-(substituted-phenyl)-3-*O*-R^4substituted-propane-1-ol or its enantiomer having a formula of



Claim 4 (Previously presented): The process of claim 1, wherein the chiral ligand is (1R, 2R)-2-*N*,*N*- substitutedamino-1-(substituted- phenyl)-2-R^3-substi- tuted-1-ethanol or its enantiomer having a formula of



and the reactant is



Claim 5 (Previously presented): The process of claim 1, wherein R^1 and R^2 is an alkyl, substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted

group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxyalkyl, C_1~C_4 alkyl, or C_1~C_3 alkoxy, or R^1, R^2 being -$(CH_2)_nX(CH_2)_m$- , X being CH_2, O, or NH; n, m is an integer from 1 to 6;

P is hydrogen, an alkyl, substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy;

R^4 is an alkyl, substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxyalkyl, C_1~C_4 alkyl, C_1~C_3 alkoxy or CN;

the electron-withdrawing group is a halogen, NO_2, CF_3, CH_3SO_2, $CH_3CH_2SO_2$, $PhCH_2OCO$, or AcO;

the electron-donating group is an alkoxy, OH, $Me_2NCH_2CH_2O$, $Et_2NCH_2CH_2O$, NH_2, or C_1~C_4 alkyl.

Claim 6 (Currently amended): The process of claim 1, wherein R^1 and R^2 is a C_1~C_{20} alkyl , C_1~C_{20} substituted alkyl, trialkylsilyl, benzyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxy alkyl, C_1~C_{20} alkyl, or C_1~C_3 alkoxy, or R^1, R^2 being -$(CH_2)_nX(CH_2)_m$- , X being CH_2, O, or NH;

n, m is an integer from 1 to 6;

R^3 is a C_1~C_{20} alkyl, C_1~C_{20} alkyl substituted with an alkyloxy or silyoxy, carboxylic group, C_1-C_{20} carbalkoxy group, hydroxyl methyl, C_3~C_{20} cycloalkyl, aryl, or CH_2OR^4, R^4 being a C_1~C_{20} alkyl, C_1~C_{20} substituted alkyl, benzyl, or substituted

benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxyalkyl, C_1~C_4 alkyl, C_1~C_3 alkoxy, or CN;

Z is H, F, Cl, Br, I, CH_3SO_2, OH, $PhCH_2O$, AcO, MeO, EtO, $Me_2NCH_2CH_2O$, $Et_2NCH_2CH_2O$, $PhCH_2OCO$, *t*-Bu, *i*-Pr, NH_2, or NO_2;

P is hydrogen, a C_1~C_{20} alkyl, C_1~C_{20} substituted alkyl, benzyl, trialkylsilyl or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxyalkyl, C_1~C_4 alkyl, C_1~C_3 alkoxy, or CN;

Y is H, F, Cl, Br, I, CH_3SO_2, OH, $PhCH_2O$, AcO, MeO, EtO, $Me_2NCH_2CH_2O$, $Et_2NCH_2CH_2O$, $PhCH_2OCO$, *t*-Bu, *i*-Pr, NH_2, or NO_2;

Rf is a C_1~C_{20} fluoro-containing alkyl;

R is a trialkylsilyl, C_1~C_{20} alkyl, C_3~C_{20} cycloalkyl, or aryl group.

Claim 7 (Previously presented): The process of claim 1, wherein R^1 and R^2 is a C_1~C_4 alkyl , tri-phenylmethyl, *t*-butyldimethylsilyl, benzyl unsubstituted or substituted with C_1-C_4 alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, or 2, 4-dimethoxybenzyl, or R^1, R^2 being -$(CH_2)_2O(CH_2)_2$- , -$(CH_2)_2N(CH_2)_2$-, -$(CH_2)_5$-, or -$(CH_2)_6$-;

R^3 is a C_1~C_4 alkyl, C_1~C_4 alkyl substituted with alkyloxy or silyoxy, carboxylic group, C_1~C_4 carbalkoxy group, hydroxyl methyl, C_3~C_6 cycloalkyl , aryl or CH_2OR^4, R^4 being a C_1~C_4 alkyl, tri-phenyl methyl, *t*-butyl- dimethylsilyl, benzyl unsubstituted or substituted with C_1~C_4 alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, 2, 4- dimethoxybenzyl, or trialkylsilyl groups;

Z is H, F, Cl, Br, I, CH_3SO_2, OH, $PhCH_2O$, AcO, MeO, EtO, $Me_2NCH_2CH_2O$, $Et_2NCH_2CH_2O$, $PhCH_2OCO$, *t*-Bu, *i*-Pr, NH_2, or NO_2;

P is hydrogen, a C_1~C_4 alkyl , tri-phenylmethyl, *t*-butyldi- methylsilyl, benzyl unsubstituted or substituted with C_1~C_4 alkyl; *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2,4-dichlorobenzyl, or 2, 4-dimethoxy- benzyl;

Y is H, Cl, Br, CH_3SO_2, $CH_3CH_2SO_2$, NO_2, or F;

Rf is a C_1~C_4 fluoro-containing alkyl;

R is a C_1~C_4 alkyl, C_3~C_6 cycloalkyl, or aryl group, aryl being a phenyl, naphenyl, furan, thiophene, or pyrrole;

halogen or halo is a fluoro, chloro, bromo, or iodo.

Claim 8 (Previously presented): The process of claim 1 ,wherein stoichiometric ratios are about 0.1- 3 : 0.1-3 : 1-4 :1 of ligand : Zinc salt: the organic base : substrate ketone or ketimine.

Claim 9 (Previously presented): The process of claim 1, wherein the salt is $ZnCl_2$, $ZnBr_2$, ZnF_2, ZnI_2, $Zn(OTf)_2$, $CuCl_2$, $CuBr_2$, $Cu(OTf)_2$, CuCl, CuBr, or Cu(OTf).

Claim 10 (Previously presented): The process of claim 1, wherein the organic base is $MeN(iPr)_2$, $HNEt_2$, $N(iPr)_3$, pyridine, NEt_3, piperidine, $EtN(iPr)_2$, or Bu_3N.

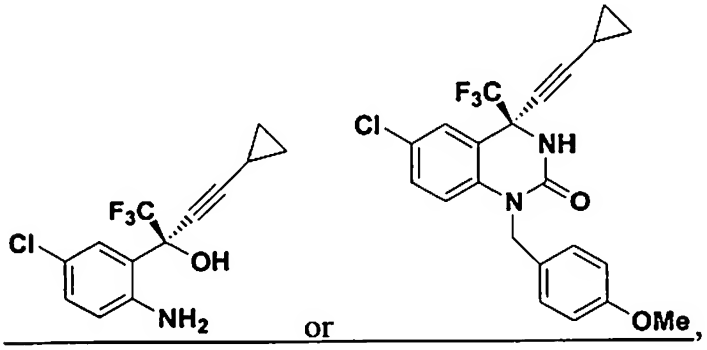
Claim 11 (Previously presented): The process of claim 1, wherein reaction temperature is 0-100°C.

Claim 12 (Previously presented): The process of claim 11, wherein the reaction temperature is 0-50°C.

Claim 13 (Previously presented): The process of claim 1, wherein the aprotic solvent is THF, dioxane, Et_2O, benzene, a mono or multi-alkyl substituted-benzene, DME, toluene, n-hexane, CH_2Cl_2, cyclohexane, or a mixture thereof.

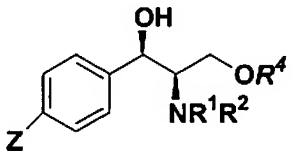
Claim 14 (Previously presented): The process of claim 1, further comprising the step of quenching the mixture by adding a proton source to give the chiral compound.

Claim 15 (Currently amended): The process of claim 1 <u>for asymmetric synthesis of chiral compound of</u>



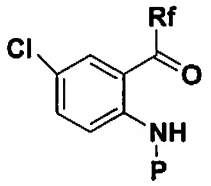
comprising the steps of

(a) mixing 0.1~3 molar equivalent of (1R,2R)-2-*N*,*N*-substitutedamino-1-(4-Z-substituted- phenyl)-3-*O*-R^4-*substituted* propane-1-ol having a formula of

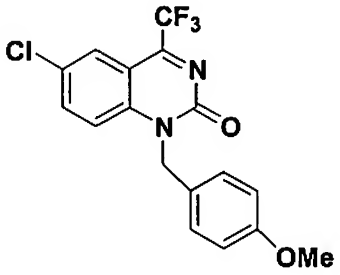


with 0.1~3 molar equivalent of cyclopropylacetylene, 0.1~3 molar equivalent of Zn(II), Cu(I)or Cu(II) salts, and 1~4 molar equivalent of an organic base in organic solvent to form a mixture;

(b) mixing ~~with~~ the mixture of step (a) with 1.0 molar equivalent of a reactant having a formula of



or

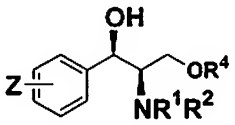


and maintaining resulting reaction mixture at a temperature of between about 0-50°C for 1-20 hrs;

(c) quenching by adding a proton source;

(d) obtaining the chiral compound.

Claim 16 (Currently amended): A compound or its enantiomer having a formula of



wherein R^1, R^2 is an amino protecting group;

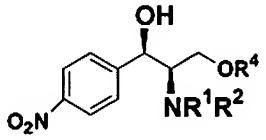
R^4 is an oxygen protecting group;

Z is NO_2, CH_3SO_2, or $\underline{CH_3CH_2SO_2}$ ~~$CH_3CH_2SO_3$~~[;], and

when Z is NO_2 at 4-postion of the phenyl, R^1 is =O, R^2 is $COCH_3$, R^4 is an alkyl, substituted alkyl, benzyl , substituted benzyl, or trialkylsilyl[;], or

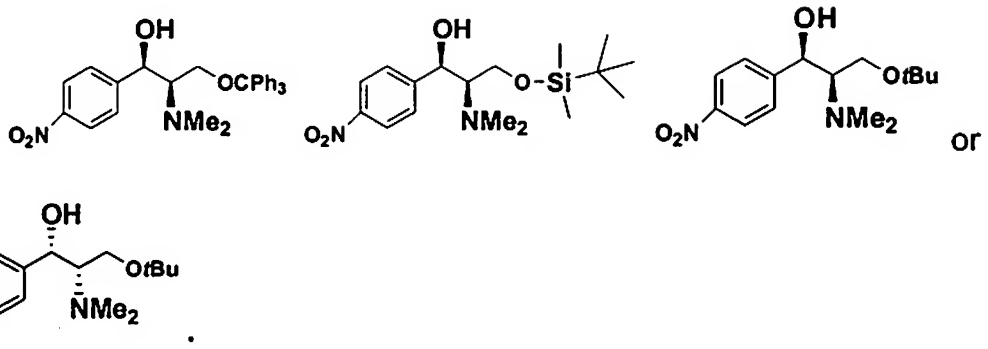
when Z is NO_2 at 4-postion of the phenyl, R^1, R^2 is CH_3, the ligand is (1R, 2R)-2-*N*,*N*-dimethylamino-1-(4- nitrophenyl)-3-*O*-R^4-1-propanol.

Claim 17 (Currently amended): The compound of claim 16 having a formula of or its enantiomer



, wherein Z is NO_2 at 4 position of the phenyl.

Claim 18 (Previously presented): The compound of claim 16, having a formula of or its enantiomer



Claim 19 (Currently amended): The compound of claim 16, wherein R^1 and R^2 is an alkyl, substituted alkyl , benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxyalkyl, C_1~C_4 alkyl, or C_1~C_3 alkoxy, or R^1, R^2 being $-(CH_2)_nX(CH_2)_m-$, X being a CH_2, O, or NH;

n, m is an integer from 1 to 6;

R^4 is an alkyl, substituted alkyl, benzyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxy alkyl, alkyl, C_1~C_3 alkoxy, or CN;

Z is NO_2, CH_3SO_2, or $CH_3CH_2SO_2$ [;], and

when Z is NO_2 at 4-postion of the phenyl, R^1 is N=O, R^2 is $COCH_3$, R^4 is only alkyl, substituted alkyl, benzyl ,substituted benzyl, or trialkylsilyl[;], or

when Z is NO_2 at 4-postion of the phenyl, R^1, R^2 is CH_3, the ligand is (1R, 2R)-2-*N*,*N*-dimethyl-1-(4- nitrophenyl)-3-*O*-R^4-1-propanol.

Claim 20 (Currently amended): The compound of claim 16, wherein R^1 and

R^2 is a C_1~C_{20} alkyl , C_1~C_{20} substituted alkyl, trialkylsilyl, benzyl, or substituted benzyl, the substituted group of alkyl or benzyl being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxyalkyl, C_1~C_4 alkyl, C_1~C_3 alkoxy, or CN, or R^1, R^2 being -$(CH_2)_nX(CH_2)_m$- , X being CH_2, O or NH;

n, m is an integer from 1 to 6;

R^4 is a C_1~C_{20} alkyl, C_1~C_{20} substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C_1~C_3 hydroxyalkyl, C_1~C_4 alkyl, C_1~C_3 alkoxy, or CN;

Z is CH_3SO_2 or NO_2[;], and

when Z is NO_2 at 4-postion of the phenyl, R^1 is =O, R^2 is $COCH_3$, R^4 is an alkyl, substituted alkyl, benzyl, substituted benzyl, or trialkylsilyloxy[;], or

when Z is NO_2 at 4-postion of the phenyl, R^1, R^2 is CH_3, the ligand is (1R, 2R)-2-*N*,*N*-dimethyl- amino-1-(4- nitrophenyl)-3-*O*-R^4-propane-1-ol.

Claim 21 (Currently amended): The compound of claim 16, wherein R^1 and R^2 is a C_1~C_4 alkyl , tri-phenyl methyl, *t*-butyldimethylsilyl, benzyl unsubstituted or substituted with C_1-C_4 alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, 2, 4-dimethoxybenzyl;

R^4 is a C_1~C_4 alkyl, tri-phenyl methyl, *t*-butyldimethylsilyl, benzyl unsubstituted or substituted with C_1~C_4 alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, or 2, 4-dimethoxybenzyl;

Z is CH_3SO_2 or NO_2[;], and

when Z is NO_2 at 4-postion of the phenyl, R^1 is N=O, R^2 is $COCH_3$, R^4 is an alkyl, substituted alkyl, benzyl ,substituted benzyl, or trialkylsilyl[;], or

when Z is NO_2 at 4-postion of the phenyl, R^1, R^2 is CH_3, the ligand is (1R, 2R)-2-*N*,*N*-dimethyl-amino-1-(4-nitrophenyl)-3-*O*-R^4-propane-1-ol.